efficiently couple power to a coil implanted within the patient's torso. In some cases the electromagnetic coil may comprise closely wound windings that approximates a planar coil. In other cases, the windings may be arranged such that they form a solenoid around the patient's torso, wherein the longitudinal axis of the solenoid is coaxially arranged with the longitudinal axis of the patient's torso.

[0107] Referring to FIG. **5**, a schematic representation of an intra-corporeal medical device **500** comprising a rechargeable power supply is illustrated. In this example embodiment, the medical device **500** may comprise the rechargeable power supply **300** illustrated in FIG. **3**. Furthermore, the medical device **500** may be implanted within a patient, for example implanted within the patient's heart **550**. In other examples, the medical device **500** may be implanted within a patient's head or limbs.

[0108] The medical device **500** may comprise a number of application specific modules **502**, and the rechargeable power supply. In this example embodiment, a coil **504** may be located at the exterior **506** of the medical device **500**. This may have an advantage of increasing the coupling efficiency of the coil. The coil **504** may be covered with a medically-safe material such as silicon or latex in order to prevent corrosion of the coil **504**. The application specific modules **502** and the remaining components of the rechargeable power supply may be arranged within a magnetic shield layer **520**, arranged to protect the components of the medical device **500** from magnetic energy received by the coil **504** or other devices that may emit magnetic fields.

[0109] In an alternative example embodiment, the coil **504** may be positioned within the medical device **500**, negating the need for covering the coil **504** in a medically-safe coating. The coil **504** may be positioned in a cavity situated between the exterior of the medical device **500** and the shield layer **520**.

[0110] In another embodiment, the coil **504** may be coated with a biocompatible coating, for example Parylene. Alternatively or additionally, the coil **504** may be coated with a hydrophobic coating and/or friction reducing coating to help with implantation. The coating may also provide for electrical isolation, heat transport and coagulation prevention.

[0111] In this embodiment, the medical device **500** comprising the coil **504** may need to be aligned correctly with an extra-corporeal power supply (not shown) in order to maximise magnetic coupling. Stabilising means **522** may be optionally utilised on the medical device **500** in order to prevent the medical device from rotating/changing orientation within the patient. The coil **504** in this example is positioned perpendicular to the direction of fluid flow in the patient's heart **550**. This may be so that the coil can be correctly aligned with the extra-corporeal power supply (not shown). Equally, the medical device **500** can be positioned such that the coil **504** is positioned parallel with the direction of fluid flow. The stabilising means **522** may be arranged to anchor the medical device **500** in a preferred orientation in order to maximise coupling between the coil **504** and the extra-corporeal power supply (not shown). The stabilising means **522** may comprise one or more anchors that are able to maintain the position of the medical device **500** without impeding fluid flow. For example, the stabilising means **522** may comprise one or more spring loaded securing arms that can be deployed once the medical device is in the correct position/orientation. The stabilising means **522** may also comprise a mesh, which is arranged to anchor the medical device **500** to the wall of the heart **550**.

[0112] Referring to FIG. **6**, a flow chart illustrating steps for supplying power to an intra-corporeal medical device, such as intra-corporeal medical device **500**, is illustrated. At step S**2-1**, an implantable medical device, for example an LVAD, is implanted into a patient. The LVAD may be implanted via a percutaneous insertion device, and arranged between the patient's left atrium and aorta. At step S**2-2**, an implantable rechargeable power supply, for example the implantable power supply **300** from FIG. **3**, is implanted in the patient. The rechargeable power supply may comprise modular components, in which case subsequent steps may be required to implant the rechargeable power supply. For example at step S**2-3**, a rechargeable power storage device, such as a rechargeable battery, is implanted into the patient and electrically connected to the medical device via an appropriate medically safe electrical connector. The rechargeable power storage device may be implanted in a different area of the patient's body compared to the medical device. For example, the rechargeable power storage device may be implanted in the inferior vena cava, and connected to the medical device via a suitable length connector. At step S**2-4**, a means for wirelessly receiving power, for example an electromagnetic coil, is implanted into the patient and electrically connected to the rechargeable power storage device. The coil may be implanted in a different area of the patient's body and electrically connected to the rechargeable power storage device via a suitable electrical connector. Positioning the coil in a different location to the medical device and/or the rechargeable power storage device may have an advantage of allowing optimum positioning of the medical device and/or the coil. For example, the coil may need to be implanted in a specific location in order to maximise energy transfer, which may be a different location and orientation to the medical device. At step S**2-5**, an extra-corporeal power transmitting device, for example the extra-corporeal power transmitting device **150** from FIG. **1**, may be positioned around the abdomen of the patient. At step S**2-6**, AC power is supplied to the extra-corporeal power transmitting device, which is supplied to a coil surrounding the patient. The current in the coil generates a magnetic field, which may be at a medically safe resonant frequency that is transmitted to the implanted coil of the rechargeable power supply through the patient's body. At step S**2-7**, the implanted coil of the rechargeable power supply couples the generated magnetic field, in the form of magnetic flux. It should be noted that in some example implementations, the means for wirelessly receiving power may comprise a number of coils for receiving the transmitted field. These coils may be aligned differently with respect to each other in order to reduce coupling issues associated with alignment of these coils with the extra-corporeal power transmitting device. At step S**2-8**, the received magnetic flux is converted to DC power, via for example a suitable AC/DC converter, and supplied to the rechargeable power storage device. At step S**2-9**, the rechargeable storage device may receive the DC power and be appropriately charged, or the rechargeable power storage device may forward the DC power onto the medical device without charging the power storage device if, for example, the power storage device is fully charged.

[0113] An advantage of supplying power to the intra-corporeal medical device in this way is that the rechargeable